October 2009
PG-DIG

Pattern Generator—Digital

Tests TVs, HDMI monitors, and image transmission devices for proper operation.

Provides 48 timings and 34 patterns.
Operates continuously for 6-8 hours when battery is fully charged.

Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500) • FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746 • Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018 • Web site: www.blackbox.com • E-mail: info@blackbox.com

FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO-FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Normas Oficiales Mexicanas (NOM) Electrical Safety Statement

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

A: El cable de poder o el contacto ha sido dañado; u

B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

C: El aparato ha sido expuesto a la lluvia; o

D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

E: El aparato ha sido tirado o su cubierta ha sido dañada.

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Table of Contents

1. Specifications 5
   1.1 General 5
   1.2 HDMI Type A Connector Pin Descriptions 5
2. Overview 6
   2.1 Introduction 6
   2.2 What's Included 6
   2.3 Hardware Description 6
   2.4 Features 7
   2.5 Typical Application 7
3. Installation 8
   3.1 Read These Notes First 8
   3.2 Using the Pattern Generator Digital 8
4. Operation 9
   4.1 Starting Status (Power Switch On Mode) 9
   4.2 Operating Guide 10
      4.2.1 Menu Operation 10
      4.2.2 Pattern Selector 11
      4.2.3 Function Selector 12
      4.2.4 Hotkey Selector 16
   4.3 HDMI Output Signals 17
   4.4 Pattern Chart 19
Appendix. Troubleshooting 20
   A.1 Calling Black Box 20
   A.2 Shipping and Packaging 20

1. Specifications

1.1 General

Cable Distance (Maximum): 16 ft. (5 m)

Display: LCD module: 16x2 characters

Highest TMDS Frequency: 225 MHz

Housing: Plastic

Resolution (Maximum): UXGA/1080p

User Controls: (7) Select switches

Video Connectors: (1) HDMI Type A

Power: Adapter: 12 VDC, 1.25 amps

Size: 1.4"H x 3.8"W x 7.1"D (3.5 x 9.5 x 18 cm)

Weight: 0.85 lb. (0.39 kg)

1.2 HDMI Type A Connector Pin Descriptions

Pin	Signal	Pin	Signal
1	TMDS Data 2+	11	TMDS Clock Shield
2	TMDS Data 2 Shield	12	TMDS Clock-
3	TMDS Data 2-	13	Not connected
4	TMDS Data 1+	14	Not connected
5	TMDS Data 1 Shield	15	DDC-SCL
6	TMDS Data 1-	16	DDC-SDA
7	TMDS Data 0+	17	DDC-Ground
8	TMDS Data 0 Shield	18	+5V Power
9	TMDS Data 0-	19	Hot Plug Detect
10	TMDS Clock+		

2. Overview

2.1 Introduction

The Pattern Generator—Digital (PG-DIG) tests TVs, HDMI monitors, and image-transmission devices for proper operation. It provides 48 timings and 34 patterns, and operates continuously up to eight hours after the battery is fully charged. Or, you can operate it by connecting the included external AC adapter.

2.2 What's Included

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500.

- Pattern Generator—Digital
- 12-VDC, 1.25 A power adapter
- 3.9 ft. (1.2-m) HD15 male-to-male HDMI cable
- This user's manual

2.3 Hardware Description

Figure 2-1 shows the pattern generator's front panel and lists its components.

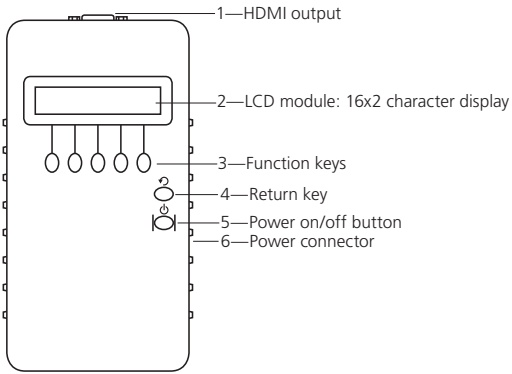


Figure 2-1. Front panel.

2.4 Features

- HDMI 1.3, HDCP 1.2, and DVI 1.0 compliant
- Supports 48 local timings (up to UXGA/1080p)
- Inexpensive and portable
- Easy-to-use interface
- Supports audio 48-kHz sample rate, 1-kHz tone
- Rechargeable battery provides up to eight hours of use
- Auto power off in battery mode
- Provides 34 patterns, including color bar, gray, grid, black.
- Easy to control via 16 x 2 character LCD display.

2.5 Typical Application

Figure 2-2 shows a typical installation.

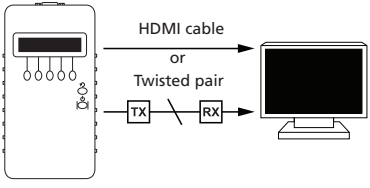


Figure 2-2. Typical PG-DIG application.

3. Installation

3.1 Read These Notes First

NOTES:

1. Before using the pattern generator for the first time, charge it continously for more than 16 hours.
2. If there is no image while using the pattern generator, make sure that:
   a. The battery is charged. If the battery is dead or faulty, the pattern generator will not switch on.
   b. The resolution is set correctly. If the pattern generator switches on but there is no image, lower the resolution or change the resolution and vertical frequency. Make sure the HDMI or HDCP mode is compatible wth the monitor.
3. Charge the battery when the battery power indicator is low.
4. The pattern generator will save the most recent setting automatically.

3.2 Using the Pattern Generator

Follow these steps to use the pattern generator:

1. Insert the external AC adapter into an AC outlet and connect the power cord to the power jack on the pattern generator.
2. Switch off the video display.
3. Connect the HDMI cable between the pattern generator and the video display.
4. Switch on the video display.
5. Press the pattern generator's power key for more than three seconds to switch the unit on/off.

4. Operation

4.1 Starting Status (Power Switch On Mode)

Figure 4-1. Starting Status mode.

1. To start the pattern generator, press the power on/off key for 2-3 seconds. It will sound a long beep. The part number and the firmware version will display.
2. Press a function key (found below the LCD display). The PG-DIG will sound a short beep confirming your selection.
3. The factory-preset starting value is P01 640x480 @60, where:

   P01=Pattern 01

   640x480=Resolution 640x480

   @60=Refresh rate 60 Hz
4. The bottom left corner of the LCD displays the current status:
   a. HDMI mode:
      DVI: output signal is DVI
      H8: output signal is HDMI 8 bit
      H10: output signal is HDMI 10 bit
      H12: output signal is HDMI 12 bit
   b. Video type (refer to EIA/CEA-861B standard)
      RGB: RGB
      Y444: YCbCr 4:4:4
      Y422: YCbCr 4:2:2 (if PG-DIG operates on DVI mode, then video type is RGB (4:4:4 with 8 bits component)
   c. HDCP: the HDCP engine has started

4.2 Operating Guide

4.2.1 Menu Operation

Figure 4-2. LCD display.

To start operation, press the function key (located below "menu" on the LCD display) to activate the menu.

After you press the MENU key, the screen shown in Figure 4-3 appears.

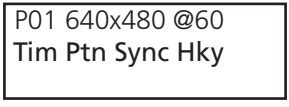


Figure 4-3. Menu screen.

Using the ▲,▼, ◀, and ▶ function keys, select the resolution or refresh rate. See Figure 4-4.

▲ increasing

▼ decreasing

◀ and ▶ choose resolution and refresh rate

↵ Enter

Figure 4-4. Timing selector.

NOTE: Under H12 mode, there is no output for the following timings:

- 1280 x 1024 @ 85
- 1600 x 1200 @ 60
- 1400 x 1050 @ 75
- 1920 x 1200 @ 60 RB

4.2.2 Pattern Selector

Using the ▲ and ▼ keys, select the pattern. See Figure 4-5.

▲ increasing

▼ decreasing

↵ Enter

Figure 4-5. Pattern selector.

Using the ▲ and ▼keys, select the blinking frequency. See Figure 4-6.

▲ increasing

▼ decreasing

↵ Enter

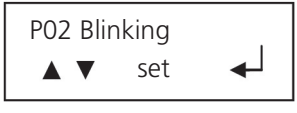


Figure 4-6. Blinking frequency.

Set: Setting black and white blinking frequency (frames/number)

Using the ▲,▼, ◀, and ▶ keys, select the black and white blinking. See Figure 4-7.

▲ increasing

▼ decreasing

◀ or ▶ choosing black or white

↵ Enter

Figure 4-7. Black and white blinking.

NOTE: The option you choose will blink.

BLK: Black

WHT: White

4.2.3 Function Selector

In the Function Selector menu, there are two options for Setup and Info. Setup options include mode, video type, and HDCP for functional setup. Info options include timing info, HTPLG info, and HDCP info for status. See Figures 4-8 and 4-9.

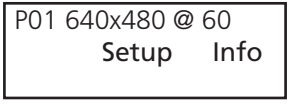


Figure 4-8. Function selector.

Setup: See Figure 4-9.

Figure 4-9. Setup option.

MOD: Switching to HDMI mode DVI-H8/H10/H12
CSC: Switching to video type RGB/Y444/Y422
HDCP: Enable/disable HDCP

↵ : output

The following timings do not support H12 mode:

- 1280 x 1024 @ 85
- 1400 x 1050 @ 75
- 1600 x 1200 @ 60
- 1920 x 1200 @ 60RB

Info: Press the ↵ key to enter the timing info menu. The LCD on the menu will display the current output's timing format. See Figures 4-10 and 4-11.

Figure 4-10. Timing info.

Using the ▲ and ▼ keys, select the timing functions. See Figure 4-11.

▲ increasing

▼ decreasing

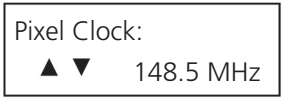


Figure 4-11. Select timing functions.

The following functions are featured under timing info.:

- Pixel Clock
- Horizontal Total
- Horizontal Front Porch
- Horizontal Sync Width
- Vertical Total
- Vertical Front Porch
- Vertical Sync Width
- Video code defined by EIA861B
- Horizontal Frequency
- Horizontal Active
- Horizontal Back Porch
- Horizontal Sync Polarity
- Vertical Freq
- Vertical Active
- Vertical Back Porch
- Vertical Sync Polarity

Hot plug info.:

Using the ▲ and ▼ keys, select the HTPLG info.. See Figure 4-12.

▲ increasing

▼ decreasing

Press the ↵ key to enter the HTPLG info menu. The pattern generator will display the status of the hot plug pin on the LCD's HDMI connector. See Figure 4-13.

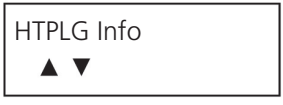


Figure 4-12. HTPLG info.

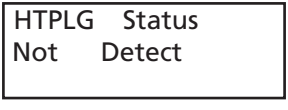


Figure 4-13. HTPLG status.

HDCP info.:

Figure 4-14. HDCP info.

Press the ↵ key to enter the HDCP menu. The LCD will display the current HDCP status. See Figure 4-15.

Figure 4-15. HDCP status.

The HDCP status features the following functions:

a. Rx attached/No Rx attached

b. Read EDID

c. Transmit DVI/HDMI

d. Validate BKSV

e. Exchanges KSVs

f. Encryption

g. RI = xxxx

4.2.4 Hotkey Selector

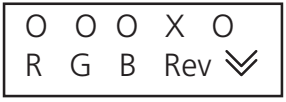


Figure 4-16. Hotkey page 1.

O: Enable
X: Disable
R: Red component output
G: Green component output
B: Blue component output
Rev: Pattern reverse
Double down arrow: Next page

Figure 4-17. Hotkey page 2.

O: Enable
X: Disable
AVM: AV mute
OUT: Video output ON/OFF
Double up arrow: Previous page

4.3 HDMI Output Signals

Table 4-1. HDMI output signal specifications.

No.	Resolution	Refresh Rate (Hz)	Pixel Freq. (MHz)	Sync Polarity	
				Hor.	Ver.
1	640x350	85	31.5	P	N
2	640x400	85	31.5	N	P
3	640x480	60	25.175	N	N
4	640x480	72	31.5	N	N
5	640x480	75	31.5	N	N
6	640x480	85	36	N	N
7	720x400	85	35.5	N	P
8	800x600	56	36	P	P
9	800x600	60	40	P	P
10	800x600	72	50	P	P
11	800x600	75	49.5	P	P
12	800x600	85	56.25	P	P
13	848x480	60	33.75	P	P
14	1024x768	60	65	N	N
15	1024x768	70	75	N	N
16	1024x768	75	78.75	P	P
17	1024x768	85	94.5	P	P
18	1152x864	75	108	P	P
19	1280x768	60 RB	68.25	P	N
20	1280x768	60	79.5	N	P
21	1280x768	75	102.25	N	P
22	1280x768	85	117.5	N	P
23	1280x960	60	108	P	P
24	1280x960	85	148.5	P	P
25	1280x1024	60	108	P	P

Table 4-1 (continued). HDMI output signal specifications.

No.	Resolution	Refresh Rate (Hz)	Pixel Freq. (MHz)	Sync Polarity	
				Hor.	Ver.
26	1280x1024	75	135	P	P
27	1280x1024	85	157.5	P	P
28	1360x768	60	85.5	P	P
29	1400x1050	60 RB	101	P	N
30	1400x1050	60	121.75	N	P
31	1400x1050	75	156	N	P
32	1600x1200	60	162	P	P
33	1920x1200	60 RB	154	P	P
34	1280x800	60	83.5	N	P
35	1366x768	60	80	N	N
36	1440x900	60	106.5	N	P
37	1440x1050	60	125.25	N	N
38	1680x1050	60	146.25	N	P
39	1440x480i	59	27	N	N
40	1440x576i	50	27	N	N
41	720x480	59	27	N	N
42	720x576	50	27	N	N
43	1280x720	50	74.25	P	P
44	1280x720	60	74.25	P	P
45	1920x1080i	50	74.25	P	P
46	1920x1080i	60	74.25	P	P
47	1920x1080p	50	148.5	P	P
48	1920x1080p	60	148.5	P	P

RB: Reduced Blanking

P: Positive

N: Negative

4.4 Pattern Chart

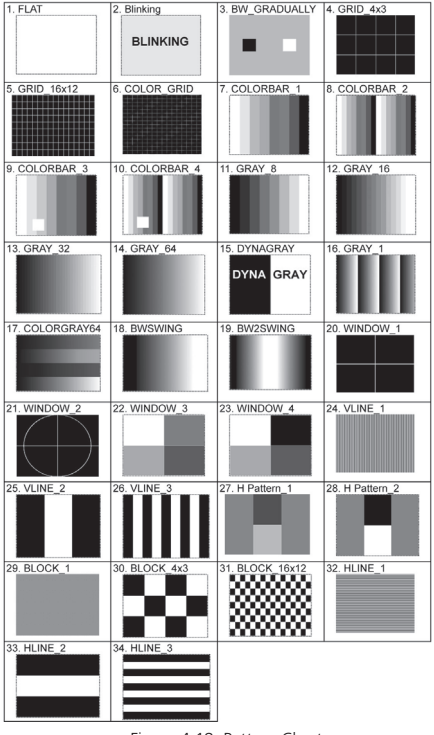


Figure 4-18. Pattern Chart.

Appendix. Troubleshooting

A.1 Calling Black Box

If you determine that your Pattern Generator—Digital is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

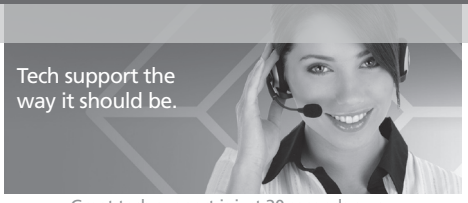
- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

A.2 Shipping and Packaging

If you need to transport or ship your pattern generator:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

Black Box Tech Support: FREE! Live. 24/7.



Great tech support is just 20 seconds away
at 724-746-5500 or blackbox.com.

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